DOOSAN Document Transmittal Upper Trishuli-1 HEP (216MW)		Date 2022-05-22	DT No.: UT1-HEP-DHI-PC-D-0031	SHEET 1 OF 1
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SUBJECT	Submission of Review Note RN-0126, RN-0127 and RN-0129			

S. N.	REVIEW NOTE NO.	REVIEW STATUS	DWG. / DOC. NO.	REV.	DWG. TITLE / DOC. DESCRIPTION	REMARK
1	RN-0126	AN	UT1-C-010-CVL-DC-42001	0D	Hydraulic Calculation of Diversion Tunnel	
2	RN-0127	RR	UT1-C-150-CVL-DG-54001	0A	Layout Drawing of Headrace Tunnel	
3	RN-0129	RR	UT1-C-050-CVL-DC-44002	0C	Slope Stability Calculations of Left Bank Dam Area	
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Date :

Legend of Review Status
A : APPROVED
AN : APPROVED AS NOTED
RR : RETURN FOR RESUBMISSION
FI : FOR INFORMATION

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Issued by DHI

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Doosan Heavy Industries & Construction Co., Ltd.

Discipline : Civil

UPPER TRISHULI-1 HEP (216MW)

Client	**Nepal Water and Energy Development Company Private Limited**
Owner's Engineer	**Tractebel Engineering GmbH / Jade Consult**

REVIEW NOTE

Contractor	**Doosan Enerbility**		
Title of the Document	Hydraulic Calculation of Diversion Tunnel		
Document No.	UT1-C-010-CVL-DC-42001	Revision	0D
Date of Documents	18.04.2022	Received Date	18.04.2022
Transmittal Form No.	UT1-HEP-DHI-D-0206		
Previous Review Date/Status	22.02.2022/AN	Prev. Review Note No.	RN-0058
Review Note No.	**RN-0126**	**Present Review Date**	**22.05.2022**
		Present Review Status	**AN**

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Comments to RC-0030:

1. Analysis purpose:
   Comments accepted.
2. Reference documents:
   The reference documents have been added in chapter 2.
3. Design criteria:
   Basic relevant documents especially doc. ref.: *UT1-C-010-CVL-DG-42005 "Outline Drawing of Diversion Tunnel Lining"* are still not approved and new revisions as per doc. ref.: *"Technical Meeting Notes LTA visit # 1 (May 2022)"* as well as a first cofferdam design for the U/S cofferdam have not been submitted yet.
4. Hydraulic formulars, discharge and characteristic water levels:
   The comments are acceptable.

DISCLAIMER

Any approval will not release the Contractor from any of his obligations under the Contract.

Sebastian Beck, Chief Design Engineer

UPPER TRISHULI-1 HEP (216MW)

Client	**Nepal Water and Energy Development Company Private Limited**
Owner's Engineer	**Tractebel Engineering GmbH / Jade Consult**

REVIEW NOTE

Contractor	**Doosan Enerbility**		
Title of the Document	Layout Drawing of Headrace Tunnel		
Document No.	UT1-C-150-CVL-DG-54001	Revision	0A
Date of Documents	01.05.2022	Received Date	06.05.2022
Transmittal Form No.	UT1-HEP-DHI-D-0219		
Previous Review Date/Status	N/A	Prev. Review Note No.	N/A
Review Note No.	**RN-0127**	**Present Review Date**	**22.05.2022**
		Present Review Status	**RR**

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General Comments

1. No detailed design report has been submitted, where the fundamental design assumptions and especially design philosophy of the lining of the Headrace Tunnel are described. Without a detailed design report, a detailed design review is not possible, especially regarding the shown cross sections, rock classes and rock support as well as final tunnel lining on sheets 10 and 11.
2. The indication of geology has to be updated according to new investigation results, for example "Hakubeshi Area".
3. It is understood that the Headrace Tunnel is diverted into
   - **Intake Tunnel**
     between end of Intake Structure (B.P. of Intake Tunnel STA. 0+91.901) and beginning of Desander (E.P. of Intake Tunnel STA. 3+19.766)
   - **Headrace Tunnel**
     between end of Desander (B.P. of Headrace Tunnel STA. 7+04.263 and Surge Shaft (E.P. of Headrace Tunnel STA. 101+94.255)

   All other structures shown in the drawings under this revision are understood as indicated schematically and are not part of this revision note RN-0127.
4. The Intake Tunnel has to be adjusted according to doc. ref.: *Technical Meeting Notes LTA visit # 1 (May 2022), subchapter 11. Power Intake: "The gate chamber shall not be located in the bend of the intake tunnel".*
5. The design of the desander is not finalized and may certainly have influence to the alignment of the Headrace Tunnel.
6. Locations of the work adits are shown as per doc. ref.: *Technical Meeting Notes LTA visit # 1 (May 2022), subchapter 6.* The given comments have to be respected.
7. The alignment has been corrected as per doc. ref.: *Technical Meeting Notes LTA visit # 1 (May 2022), subchapter 7.*
8. Topographic issues will be commented with a separate review note.

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Sebastian Beck, Chief Design Engineer

UPPER TRISHULI-1 HEP (216MW)			
Client	**Nepal Water and Energy Development Company Private Limited**		
Owner's Engineer	**Tractebel Engineering GmbH / Jade Consult**		
REVIEW NOTE			
Contractor	**Doosan Enerbility**		
Title of the Document	Slope Stability Calculations of Left Bank Dam Area		
Document No.	UT1-C-050-CVL-DC-44002	Revision	0C
Date of Documents	09.05.2022	Received Date	09.05.2022
Transmittal Form No.	UT1-HEP-DHI-D-0221		
Previous Review Date/Status	24.03.2022/RR	Prev. Review Note No.	RN-0093
Review Note No.	**RN-0129**	**Present Review Date**	**22.05.2022**
		Present Review Status	**RR**
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In the previous review note it was stated that the geomechanical input data for soils were wrongly determined and are hence unreliable. They were provided in that document as Tab. 3.2-1.

In the document in hand, input data for soil for the calculation are no longer provided. Therefore, the document cannot be reviewed in more detail and the results presented are considered unreliable.

In addition, the calculations are evidently wrong and the results misleading. For example, in Fig. 4.3-1 (copy see below), which shows the results of stability calculations with slope support (micro-piles), the micro-piles do not penetrate the sliding plane. Clearly the results of such wrong assumptions and calculations are misleading.

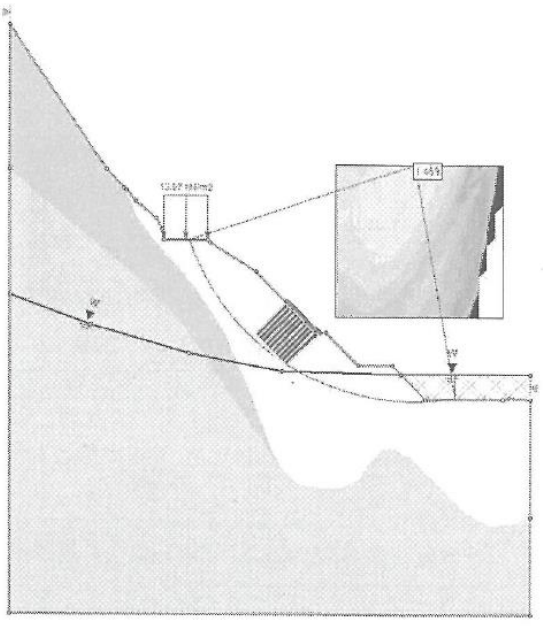

Figure 4.3-1 Safety factor of section E in case 1

Another example of engineering nonsense is provided in Fig. 4.4-1 (copy see below) of the calculation report. The calculated safety factor of 1.6 refers to a shallow slide far above the micro-pile supported section of the slope. It is needless to comment on this any further.

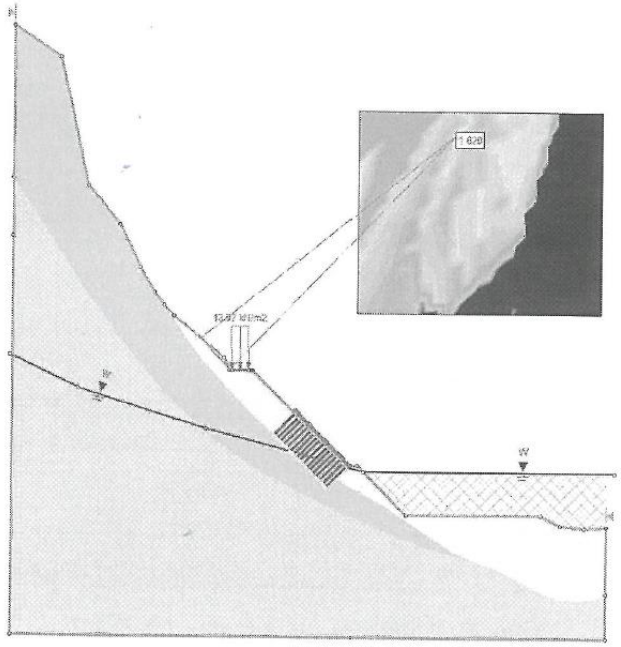

Figure 4.4-1 Safety factor of section J in case 1

In addition, the designer continued to use different slip circles for same calculation sections, which is another fundamental error in slope stability calculations, see example below.

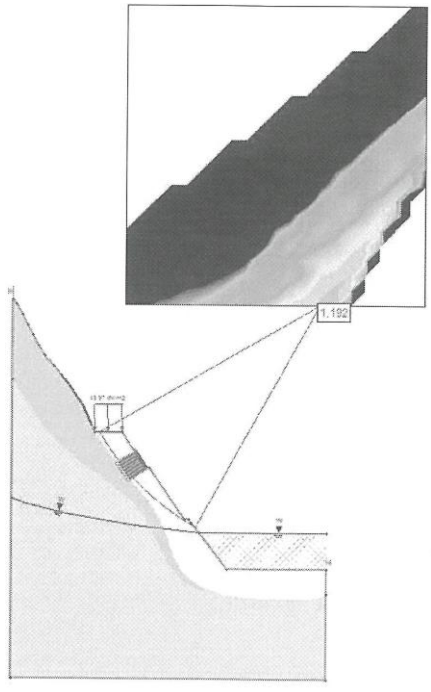

Figure 4.1-3 Safety factor of section B in case 2a

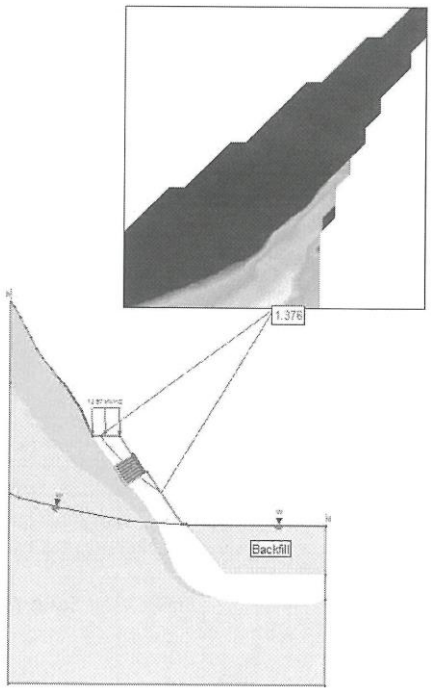

Figure 4.1-4 Safety factor of section B in case 3

From the few examples provided above, one clearly identifies the designer of being unaware of basic knowledge and rules for soil slope analyses. It is difficult to understand that upon such faulty design calculations, conclusions were drawn that shall serve as a robust tool for decision making for implementation of a large slope stability structure in a large hydropower project as the UT-1 Project.

The document is returned for resubmission.

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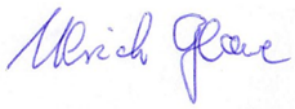

Dr. Ulrich Glawe